

## **RASHTRIYA CHEMICALS AND FERTILISERS LIMITED THAL UNIT, ALIBAG, RAIGAD (MAHARASHTRA)**

### **Unit Profile :**

Thal Unit of Rashtriya Chemicals & Fertilizers Ltd. (RCF) is located about 100 KM south of Mumbai on the western coast of Raigad district. Main product of Thal unit is Ujjwala Urea for which raw material is ammonia and carbondioxide coming from Ammonia plants. We have two huge Ammonia plants of 1500 MTPD capacity each. Urea plant consists of three urea streams with a capacity of 1725 MTPD each. The unit has received ISO14001 certification in June 2001. The final certification Audit for OHSAS 18001 (Occupational Health & Safety Assessment Series) is over in August.04 and we have been recommended for certification by accredited agency.

Inspite of severe natural gas shortage we have produced highest ever productions in the year 2003-2004 by successfully utilising our Naphtha feed supplement scheme by more than 100 % of its design capacity.

Apart from fertilisers the Thal unit manufactures a variety of chemicals like Dimethyl Formamide, Methyl Amines and Di methyl Acetamide . Our unit is the only one unit producing DMF in India. We also export DMAc. We have received ISO-9001 in the year 1997 for our industrial chemicals manufacturing and despatches.



## Energy Consumption :

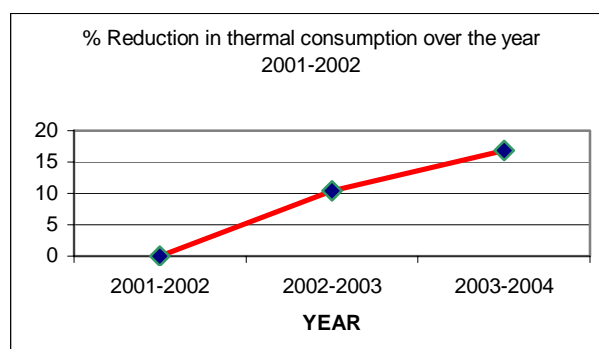
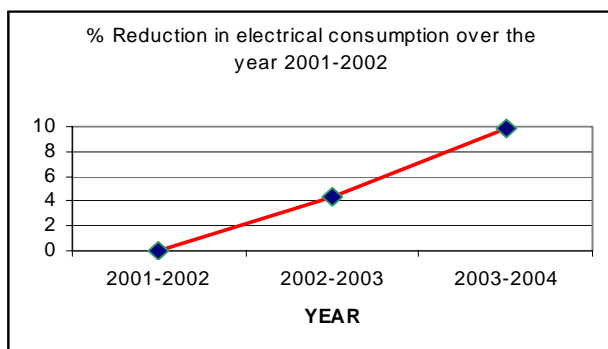
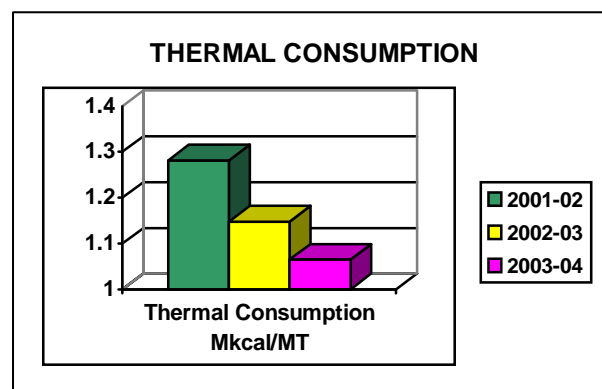
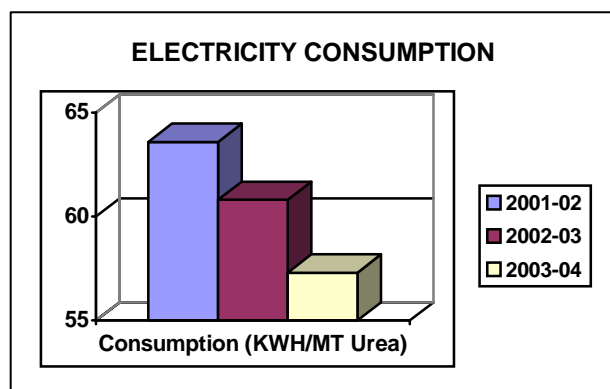
To cut down on costlier naphtha and remain in competition with the new generation plants we have implemented many energy conservation measures. These measures have reduced our energy consumption drastically and have put us at par with the other units in mixed feed group.

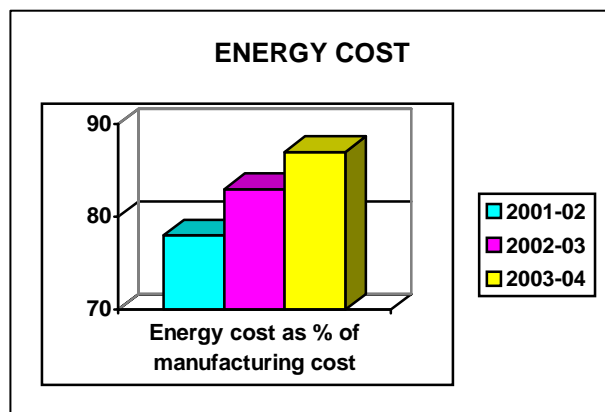
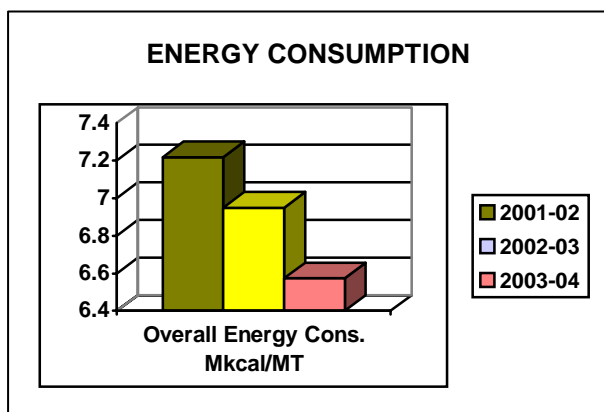
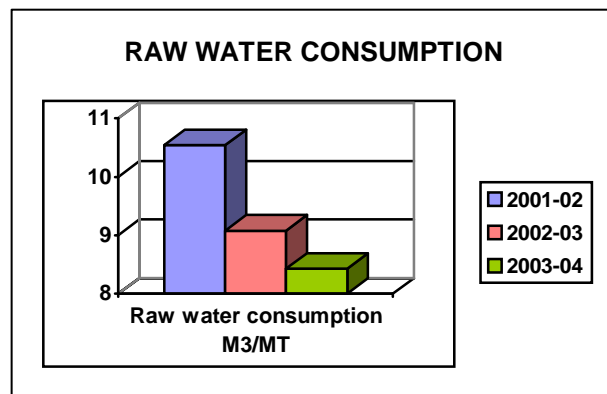
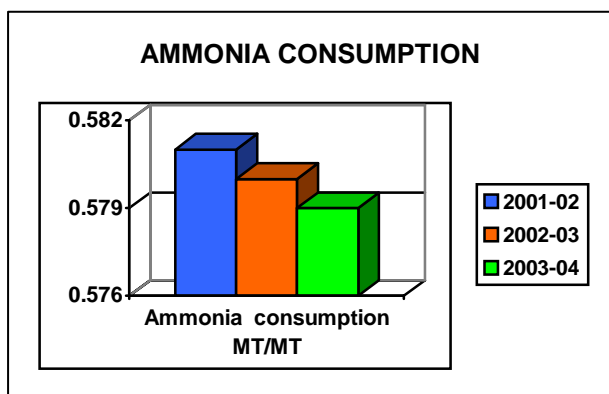
Major chunk of Urea energy is through ammonia consumption. Hence the stress is always on reduction in ammonia energy. Reduction in energy not only saves cost but also reduces load on age old plants. Urea and ammonia plants at Thal are more than 20 years old.

Specific energy consumption for Ammonia and Urea plants is shown below :

Plant	2001-02	2002-03	2003-04
Ammonia production (MTPY)	831175	885550	1014900
Ammonia (Mkcal/MT)	9.81	9.639	9.202
Urea production (MTPY)	1451150	1537300	1731350
Urea (Mkcal/MT)	7.218	6.949	6.574

YEAR	ELECTRICITY		THERMAL	
	Consumption (KWH/MT UREA)	% reduction over 2001-2002	Consumption (MKCAL/MT UREA)	% reduction over 2001-2002
2001-2002	63.60	--	1.281	--
2002-2003	60.80	4.40	1.148	10.38
2003-2004	57.30	9.91	1.065	16.86





Even after substantial reduction in thermal consumption the cost of energy as % of manufacturing cost shows a rising trend. This is because of steep hike in naphtha prices and increase in naphtha consumption (Costlier substitute) due to natural gas shortage.

**Energy Conservation Commitment, Policy & Organizational Set up.**

Energy conservation at RCF, Thal has been always at top priority since inception. Thal fertiliser complex was first one among the series of energy efficient, large gas based plants. Thal plants have carried out a number of improvements to reduce energy losses and to remain at par with new generation plants. We have our own energy management policy .

A special energy cell has been formed which is headed by Chief General Manager. Energy core group consists of senior officials from all departments and from different engineering fields. The unit has appointed two Energy Managers for streamlining and co-ordinating the efforts in the field of energy Conservation. Energy cell conducts a monthly review meeting. In this meeting new lookouts for energy savings are discussed and the projects already undertaken are reviewed.

Energy conservation week is celebrated every year from 14<sup>th</sup> December to 21<sup>st</sup> December. All the plants like process, utilities etc. present their achievements towards energy conservation alongwith the future plan and targets. The plant making best efforts and realising the set targets is awarded. Also slogan competition, poster competitions are held. On the last day of the energy conservation week a Quiz competition is held which is attended by Engineers as well as Workmen.



Rashtriya Chemicals & Fertilizers Ltd. Thal  
( A Government of India Undertaking )

## ENERGY MANAGEMENT POLICY

*We at Rashtriya Chemicals & Fertilizers Ltd. Thal Unit commit ourselves to continually improve our energy performance in all our activities, products & services through:*

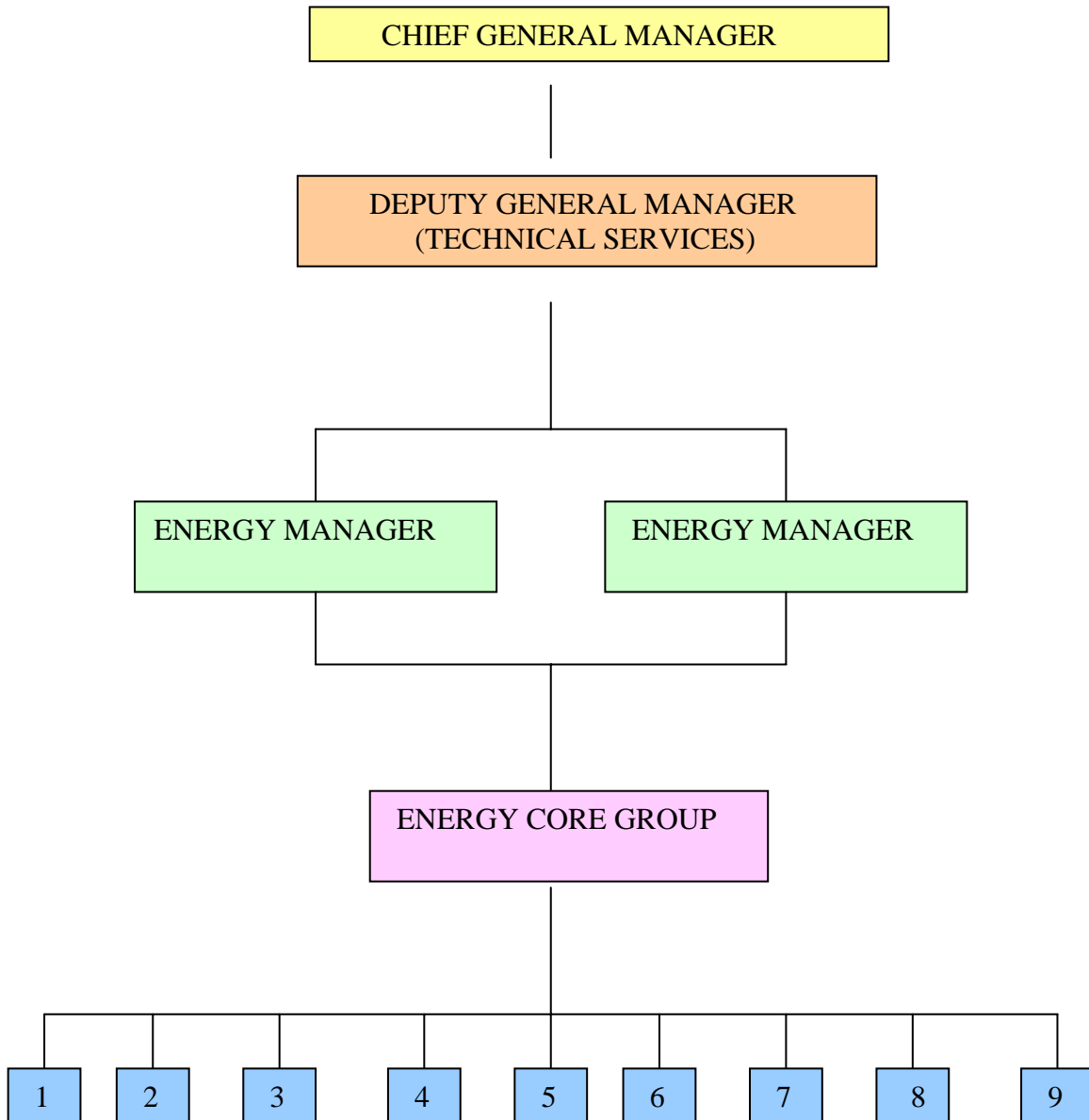
- ⚡ Continual upgradation of ecofriendly technology for production of Fertilizers & Chemicals.*
- ⚡ Conservation and optimal utilization of natural resources by adopting reduce, reuse & recycle methods.*
- ⚡ Continuous training programme for increasing energy conservation awareness throughout the organization.*
- ⚡ Regular management reviews to ensure continual improvement & to achieve our goal of reducing specific energy consumption by 1 % every year till 2010.*

(S.K.

*Date: 22<sup>nd</sup> December 2003*

*EXECUTIVE DIRECTOR (THAL)*

ENERGY CONSERVATION CELL STRUCTURE



***ENERGY CONSERVATION ACHIEVEMENTS***

During the year 2003-2004, we have implemented 26 major energy saving schemes giving substantial energy as well as monetary savings. Apart from these major schemes many more small suggestions were implemented.

Energy saving proposals implemented were suggested & processed by Energy cell. Also each plant has given its own energy reduction plan for the year during Energy week. Some of the suggestions were through brain storming sessions and initiatives from employees.

**We have implemented energy conservation schemes having potential of saving Rs 1218.93 Lakhs/year with the investment of Rs.464.93 Lakhs. As the schemes were implemented during the course of the year at different points of time, the net savings recorded were Rs. 370.71 Lakhs in the year.**

**Major chunk of energy was saved due to sustained running of plants with minimum failures. Ammonia plants could achieve highest ever stream days of 348.61 days leading to highest ever production of Ammonia and Urea with lowest ever energy consumption in the year 2003-2004. It is worth mentioning that Primary Reformer for Ammonia stream-I was continuously in operation uninterruptedly for 2 years (16<sup>th</sup> May 2002 to 15<sup>th</sup> March 2004 and Primary Reformer of stream-II was in operation for 1 year ( 31<sup>st</sup> March 2003 to 19<sup>th</sup> March 2004).**

Major schemes implemented during the year are listed below :

### ***ENERGY CONSERVATION SCHEMES***

#### **1. NEW HIGH PRESSURE STEAM HEADER FOR UREA PLANT**

There was an excess pressure drop in steam header piping going to Urea plant resulting in high steam consumption in CO<sub>2</sub> compressor .An additional 16” header was connected from common header in SGP to Urea header in April.03.

##### **Before New Header :**

There was an excess pressure drop in steam header piping going to T.G.sets resulting in high steam consumption in T.G. sets. An additional header was connected from common header in SGP to T.G sets in May.03.

##### **Before New Header :**

Steam Pr. : 93.72 Kg/cm<sup>2</sup>  
Steam cons.: 157 MTPH

##### **After New Header:**

Steam Pr. : 99.25 Kg/cm<sup>2</sup>  
Steam cons.: 154.5 MTPH  
Steam saving: 2.5 MTPH  
Savings: Rs.240.89 Lakhs/Year



#### **2. NEW HIGH PRESSURE STEAM HEADER FOR TG SETS**



### 3. ADVANCED CONTROL SYSTEM USING MODEL BASED MULTIVARIABLE CONTROL TECHNOLOGY FOR AMMONIA PLANT

Advanced Control System has been installed in Ammonia Plant. It mainly controls 4 process parameters :

- Pri. Ref. outlet temperature.
- Oxygen % in flue gas.
- Steam to carbon ratio.
- Hydrogen/Nitrogen ratio.

#### **Before ACS :**

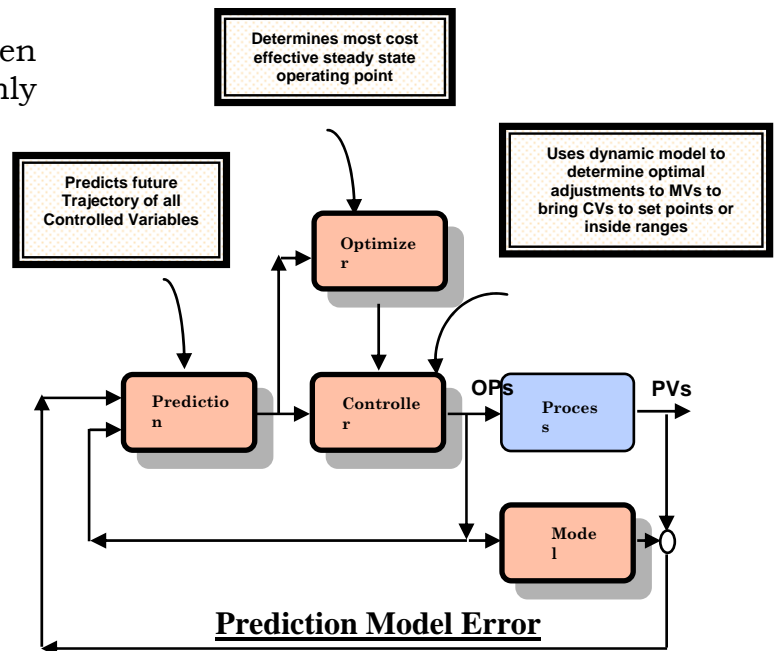
Sp.Energy : 8.989 Mkcal/MT

#### **After ACS:**

Sp.Energy : 8.936 Mkcal/MT

Net saving : 0.053 Mkcal/MT

Savings : Rs.32.84 Lacs/Yr



#### 4. HOLLOW FRP BLADES FOR CONDENSATE COOLER IN AMMONIA PLANTS

Stripper condensate cooler fan blades were replaced with hollow FRP in both streams of ammonia plant. for 4 no. of fans.

##### **With Solid fan blades :**

Power cons. : 17.56 KW per fan

##### **With Hollow fan blades :**

Power cons. : 10.06 KW per fan  
Power saving: 7.5 KW per fan  
Savings(4nos): Rs.9.5 Lakhs/Year



#### 5. USE OF UREA CONCENTRATE FOR CROWN WASHING IN UREA PLANTS

To remove the polymers the crown of the vacuum separator is washed with water and the solution is diverted to urea storage tank and afterwards it is re-injected. The re-injection results into excess consumption of steam.

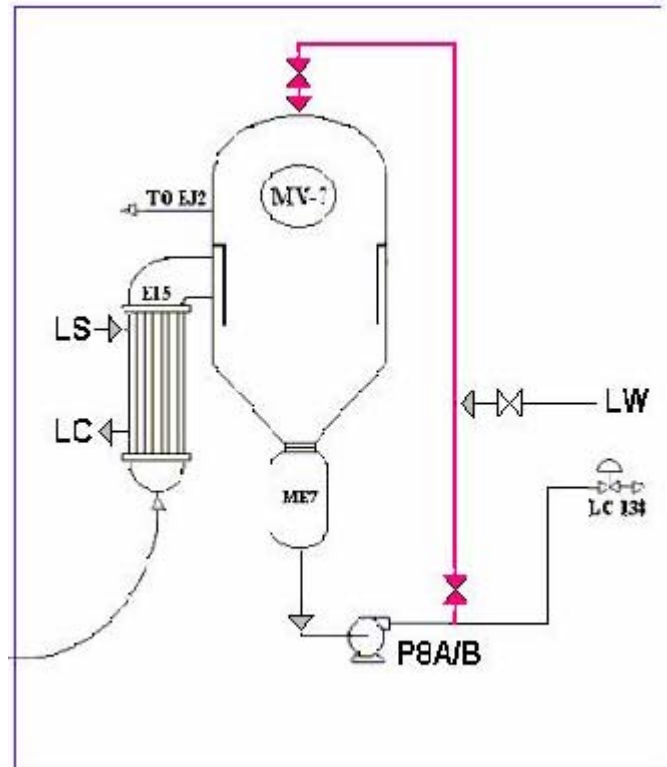
A connection was provided from Urea melt solution going to prilling tower to the crown washing line. So instead of water, concentrated urea melt was used for crown washing. During such washing the solution was not required to be diverted. This has avoided re-injection of solution. This was implemented in two units.

##### **Before modification :**

Steam cons. per washing : 25 MT  
Total washings in a month: 8  
for two units.  
Steam cons. : 4800 MTPY

##### **After modification:**

Steam saved : 4800 MTPY  
Savings : Rs.57 Lakhs/Year



## 6. CORROCOATING OF COOLING TOWER PUMP IN UREA PLANT

Corrocoating of three pumps in Urea has been carried out resulting into substantial power saving.

### **Before Corrocoating :**

Power cons. : 4752 KW

### **After Corrocoating :**

Power cons. : 4485 KW

Power saving: 267 KW Total

Savings :Rs.84.58 Lakhs/Year



## 7. MODIFICATION IN HARDWARE & SOFTWARE OF PLC CONTROL FOR BAGGING PLANT

Following modifications were carried out in Programmable Logic Control (PLC) to reduce power consumption :

1. Hardware Interlock wiring has been modified to stop the motors of empty running filled bag conveyors.
2. Software modifications incorporated for reduction of energy consumption by logic to disable simultaneous operation of all 3 series belts operation.
3. Software modification to disable multiple empty bunker belts operation .

### **Before modification**

Power Consumption : 2.365 KWH/MT of Urea

### **After modification**

Power Consumption : 1.884 KWH/MT of Urea

Power savings : 93 KW

Monetary savings : Rs.29.46 Lakhs/ year

**OTHER SCHEMES RESULTING INTO HUGE SAVINGS WITH MINIMUM OR NO INVESTMENT :**

1. In urea plant 4 pumps are provided for cooling water circulation out of which 3 pumps are always in line to supply cooling water to three Urea streams. Each pump has a capacity of 11000 M<sup>3</sup>/Hr. Whenever the plant was on low load or only 2 out of 3 urea units were running all the 3 pumps were required to be run resulting into excess power consumption. A half capacity pump with a flow of 6500 M<sup>3</sup>/Hr was installed for such eventuality. However, now this pump has been run on sustained basis i.e we run two and half pumps instead of 3 pumps even when all three units are in line.

Power saving : 600 KW  
Monetary saving : 1.90 Crores per year

2. For supplying raw water to plants, water coming from State Industrial Development Corporation was first taken to reservoir and then it was pumped to plants. A modification was done so that SIDC water line is directly connected to the pump discharge header to utilize water supply pressure head. Due to this the water pump has now been stopped and water is supplied to various plants through gravity only.

Reduction in power consumption : 90 KW  
Monetary Benefit : 15.77 Lakhs per year

3. Urea plant is producing process condensate of BFW quality which is directly fed to service boilers. Therefore BFW required for service boilers from water treatment plant is less and the desired quantity can be transferred by gravity. This has resulted into stoppage of one pump for 12 Hrs a day.

Power Saving : 332 KW per day  
Monetary savings : 4.85 lakhs per year

4. Service boilers has two turbine driven pumps. One BFW pump was kept motor driven so as to facilitate extraction of 2 ata steam from Turbo generator. This has increased efficiency of Turbo Generators and has resulted into steam saving.

Steam saving : 0.1 MT/MW  
Monetary savings : 240.89 Lakhs per year.

5. Installation of solar water heater in Company Guest House has given a saving of Rs. 3.97 Lakhs/Year.

6. Replacement of tubelight ballasts with energy efficient ballasts. (150 Nos)

7. Replacement of tubelights by energy efficient T-5 tubelights in factory premises.(600 Nos,)
8. Switching off of underloaded transformer TPC 2, 2 Nos. Lighting Transformer, 3 other transformers.
9. Replacement of 160 W MLL lamps by 23 W CFL lamps.
10. Switching off of one Cooling Tower-III fan during winter season for 12 Hrs for 2 months.
11. Running of only one floating Surface Aerator instead of two in ETP.
12. For 10 days when Process Air compressor-III of Ammonia plant was running , two Instrument air compressor in ammonia plant and one instrument air compressor in Urea plant was stopped resulting into saving of Rs.3.45 lakhs.

### *Energy Conservation Plans and Targets*

#### **Short Term Plan**

1. A new gas /gas exchanger to be installed at 2<sup>nd</sup> stage discharge of CO<sub>2</sub> compressor for heating the gas going to reactor. This will reduce the load on next intercooler and heat load to cooling tower.
2. Off gases from M.P section of Urea plant to be fired in Primary reformer of Ammonia plant as fuel to save natural gas.
3. Installation of variable frequency drive for one no. ammonia feed pump in urea plant.
4. Small capacity passivation air blower instead of existing blowers for individual urea plants.
5. Installation of model based advanced control system in ammonia stream-II.
6. Evaporative cooling system in both Process Air Compressors of Ammonia plant.
7. Transfer of D.M.Water from D.M. plant to Make up tank of steam Generation plant by gravity flow. This will result into stopping of one pump.
8. Installation of variable frequency drive on various pumps in Ammonia, Urea & Steam Generation plants.
9. Corrocoating of pumps in Ammonia, Urea and Steam generation plants.

*Implementation of the above schemes in the year 2004-2005 will help in achieving energy target for ammonia and Urea plant as per our energy management policy.*

#### **Long Term Plan**

1. Replacement of LP condensate stripper in ammonia plant with M.P.stripier for steam saving.

2. Syn gas Compressor turbine internal to be replaced for steam saving .
3. Gas turbine driven process air compressor with heat recovery steam generation (HRSG) leading to stopping of Auxiliary Boilers.
4. Capacity enhancement of process air compressors by changing its internals.
5. Suitable methods to recover heat from flue gas to reduce the temperature from 185 °C to 145 °C is being studied.

## *ENVIRONMENT & SAFETY*

### **ENVIRONMENT MANAGEMENT AT RCF THAL**

The environment management of RCF Thal would serve as a role model for any Industry in this country. It is really is a matter of justifiable pride and great skill that the gigantic Thal plants are environmentally managed in a very proficient manner.

The foundation of a successful environmental management system was laid, as early as in 1980. Great emphasis was laid on making a datum level of the ambient air around the plant, with a pledge *not to cross that level even when the fertilizer plants would be fully commissioned* & thus round the clock monitoring of ambient air was started way back in 1980 when elsewhere on the site earthmoving was taking place.



## **SALIENT FEATURES OF ENVIRONMENT ACTIVITIES.**

- Comprehensive Effluent Treatment and In-built Pollution Control Facilities in process plants, maintained and monitored by a dedicated team of Sr. managers and well qualified engineers.
- Environment and Safety policy covering the plants and in the interest of employees, community, transporters, contract workmen, customers etc.
- Environment Impact assessment studies carried out by expert agencies such as National Environmental Engineering & Research Institute ( NEERI ), Nagpur.
- Quantitative Risk Assessment for all process plants also done by NEERI.
- Marine Impact Assessment studies conducted by National Institute of Oceanography (NIO).
- Green Belt Development studies done by expert agency viz. "Blatter Herbarium. "
- Statistical & Trend Analysis done by expert agencies.
- Annual preparation of Environment Statement.
- Comprehensive Environment Audit by Regional Research Laboratory, Bhopal.
- Disaster Management (Offsite and Onsite) and Emergency Preparedness Plan.

The systematic way in which the Environment is managed at Thal prompted the unit to go one step further and work harder as per the set International standards for acquiring the ISO 14000 norm. A Core group of select engineers from each plant and an alert Management Representative fulfilled the extensive requirements of this standard and eventually, the Thal unit of RCF received the coveted ISO 14001 Certificate for the entire facility on 21<sup>st</sup> June 2001. After successful implementation of EMS (Environment Management System), re-certification is obtained in June.2004.

RCF strives to ensure total compliance with statutory requirements and always establishes higher standards of achievements.

### **SAFETY**

RCF firmly believes in that all accidents are preventable and management of occupational safety, health and environment is an important tool to achieve productivity and to avoid national loss.

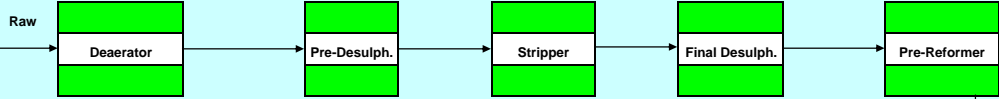
The safety of all employees, customers, and neighboring community is paramount to achieve and maintain reasonably high standards of safety and health of employees, plants, machines and environment community at large. To mould all these aspects of safety in a comprehensive management system, RCF prepared and implemented Occupational Health and Safety assessment series OHSAS 18001 system. Extensive documentation & Safety management plans are prepared for reducing risk and safety related unusual occurrence (SRUO).

The final certification Audit for OHSAS 18001 (Occupational Health & Safety Assessment Series) is over and we have been recommended for certification by accredited agency.

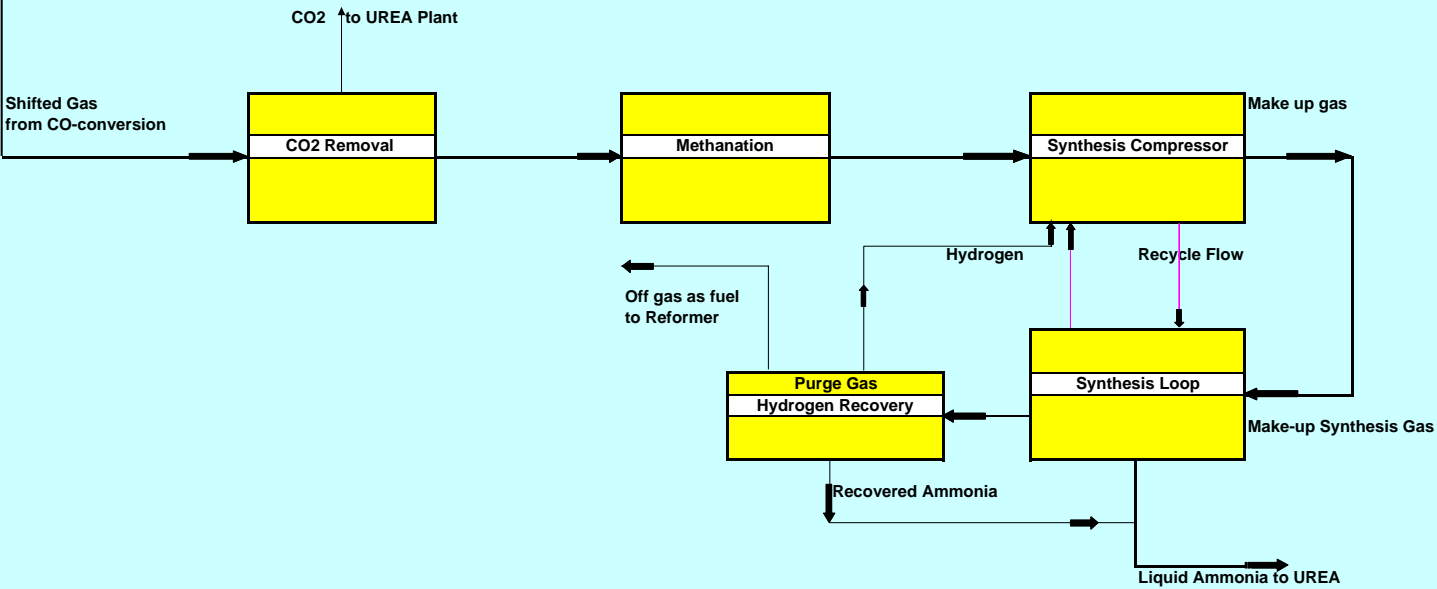
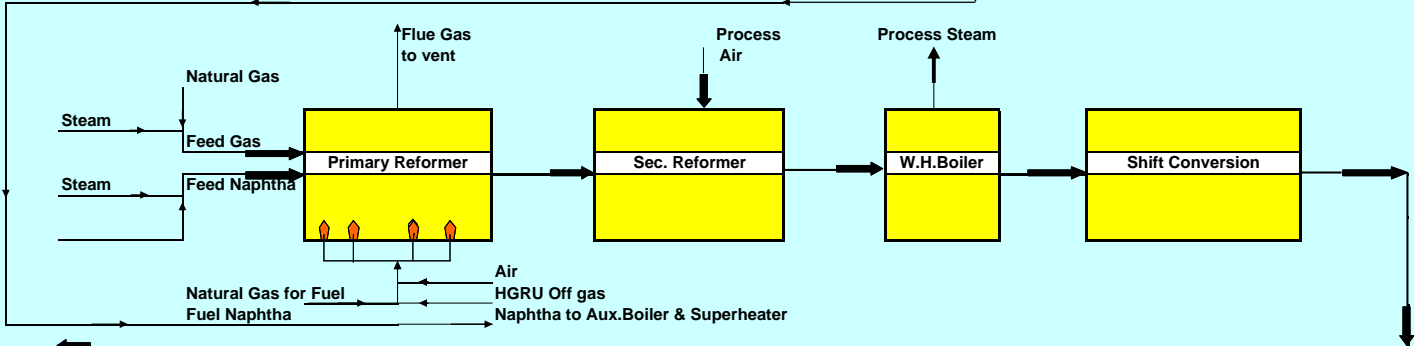


**Rashtriya Chemicals & Fertilizers Ltd.**  
**THAL AMMONIA PLANT (Gas + Naphtha Feed) - BLOCK DIAGRAM**

**Naphtha De-Sulphurisation**



**Ammonia Process**



# Rashtriya Chemicals & Fertilizers Ltd.

## THAL UREA PROCESS FLOW - BLOCK DIAGRAM

